

Name: \_\_\_\_\_

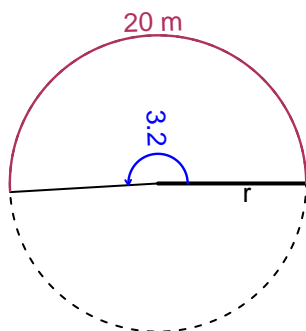
Date: \_\_\_\_\_

## Trig Final (SLTN v631)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

### Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 3.2 radians. The arc length is 20 meters. How long is the radius in meters?

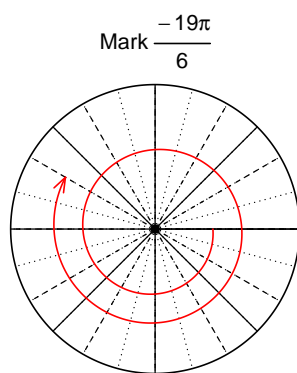


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$r = 6.25$  meters.

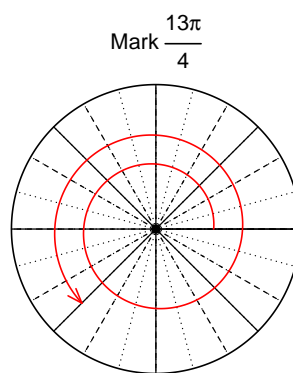
### Question 2

Consider angles  $-\frac{19\pi}{6}$  and  $\frac{13\pi}{4}$ . For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for  $\cos\left(-\frac{19\pi}{6}\right)$  and  $\sin\left(\frac{13\pi}{4}\right)$  by using a unit circle (provided separately).



Find  $\cos(-19\pi/6)$

$$\cos(-19\pi/6) = \frac{-\sqrt{3}}{2}$$



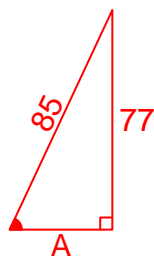
Find  $\sin(13\pi/4)$

$$\sin(13\pi/4) = \frac{-\sqrt{2}}{2}$$

### Question 3

If  $\sin(\theta) = \frac{-77}{85}$ , and  $\theta$  is in quadrant IV, determine an exact value for  $\tan(\theta)$ .

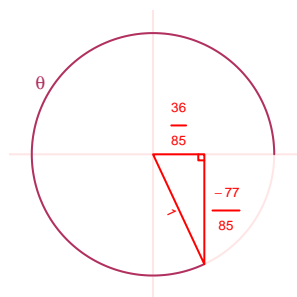
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}A^2 + 77^2 &= 85^2 \\A &= \sqrt{85^2 - 77^2} \\A &= 36\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\tan(\theta) = \frac{\frac{-77}{85}}{\frac{36}{85}} = \frac{-77}{36}$$

### Question 4

A mass-spring system oscillates vertically with a midline at  $y = -3.39$  meters, an amplitude of 8.21 meters, and a frequency of 6.83 Hz. At  $t = 0$ , the mass is at the maximum height. Write an equation to model the height ( $y$  in meters) as a function of time ( $t$  in seconds).

Any of these equations would get full credit.

$$y = 8.21 \cos(2\pi 6.83t) - 3.39$$

or

$$y = 8.21 \cos(13.66\pi t) - 3.39$$

or

$$y = 8.21 \cos(42.91t) - 3.39$$